CHAPTER 14: FIREWOOD DRYING

The moisture content of firewood is expressed (in the case of its use in boilers) as Wet Basis = %Hbh (percent moisture content on a wet basis).

Therefore, when measuring moisture, a quantity of firewood is weighed at its moisture content (Ph) and dried to a constant weight (Ps).

To calculate %Hbh, the formula is:

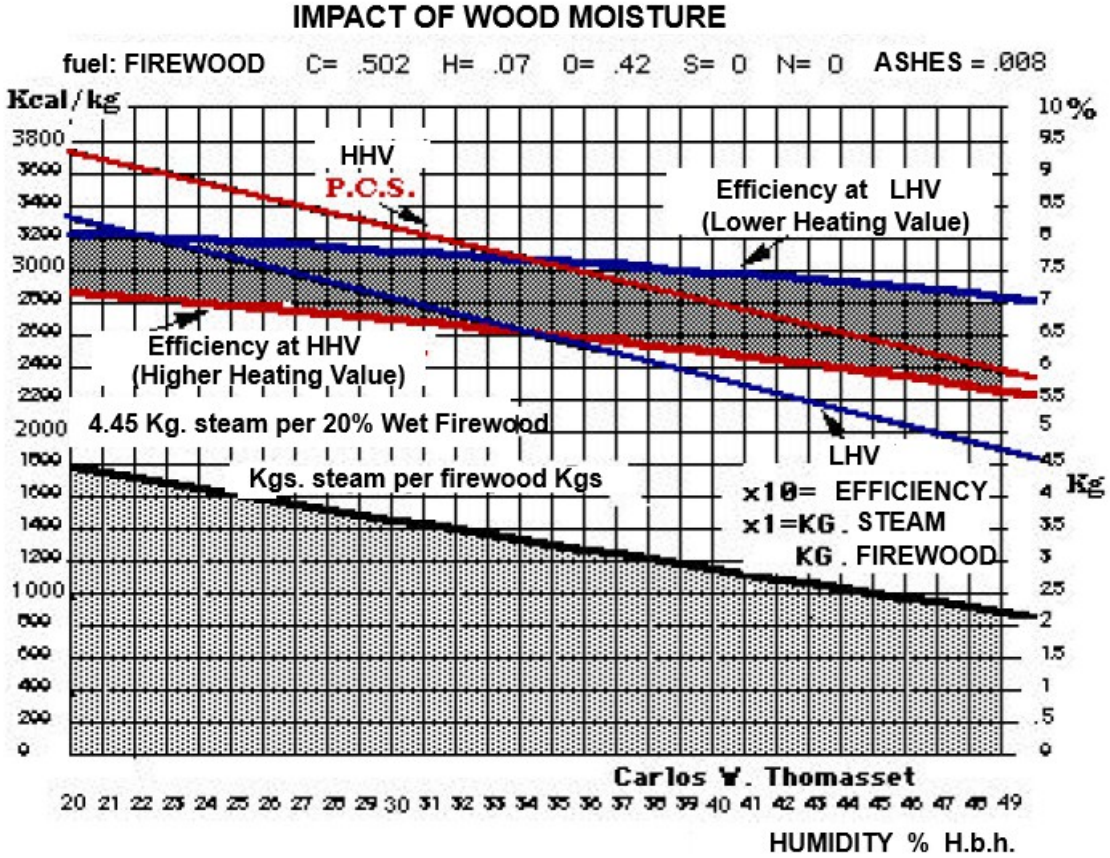
%Hbh = [(Ph - Ps) / Ph] x 100 = (% Moisture content on a wet basis).

If firewood is purchased based on a specific moisture content, to calculate the "equivalent" value (in energy value, i.e., its equivalent to dry weight: Ps) from weight A to weight B, the following calculation can be used:

PhB = (1- %HbhA/100) x PhA / (1-%HbhB/100)

%HbhA = % Moisture content on wet basis of weight A
%HbhB = % Moisture content on wet basis of weight B
PhA = Wet weight A, PhB = Wet weight B to be calculated.

Let's look at the importance of the moisture content of firewood (expressed on a wet basis) in the values related to steam generation.



In the graph above (with the calorific value in kilocalories on the left, the ordinate on the x10 axis representing efficiencies, and the kilograms of steam per kilogram of wood on the x1 axis, and the moisture content of the wood on a wet basis (Hbh) on the abscissa),

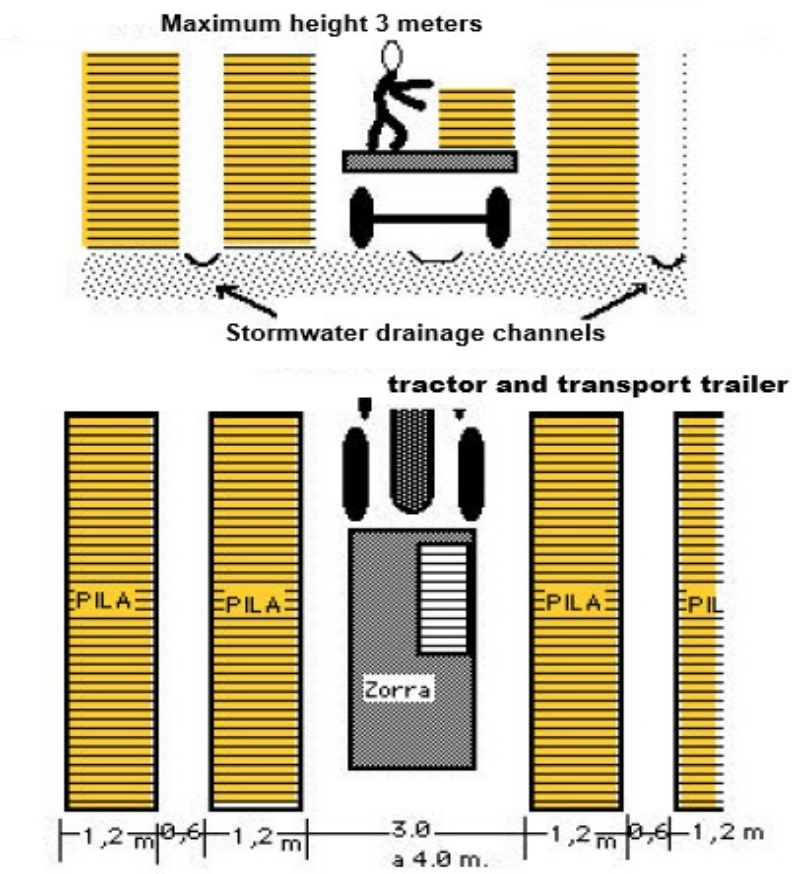
Hbh = percent moisture content on a wet basis

We see that with wood moisture content between 20% Hbh and 49% Hbh, the calorific value decreases in a downward curve (with the lower heating value decreasing further due to the increased moisture content), which in turn causes the efficiency to also decrease.

This is further reflected in the fact that with a moisture content of 20% HB, 4.45 kg of steam are produced per kg of wood,

but when the moisture content increases to 49% Hbh, only about 2.25 kg of steam can be produced per kg of wood.

We have assumed that the excess air is twice the moisture content (%) and that the boiler is operating with values that have remained constant, except for the excess air.



Arrangement of eucalyptus logs for drying.

Proper firewood drying is crucial, as improper storage can result not only in inadequate drying (the moisture content doesn't decrease within the expected timeframe), but also in various types of losses: biological decay ("burning," "fermentation," etc.), loss of volatile compounds ("distillation"), insect damage, and so on.

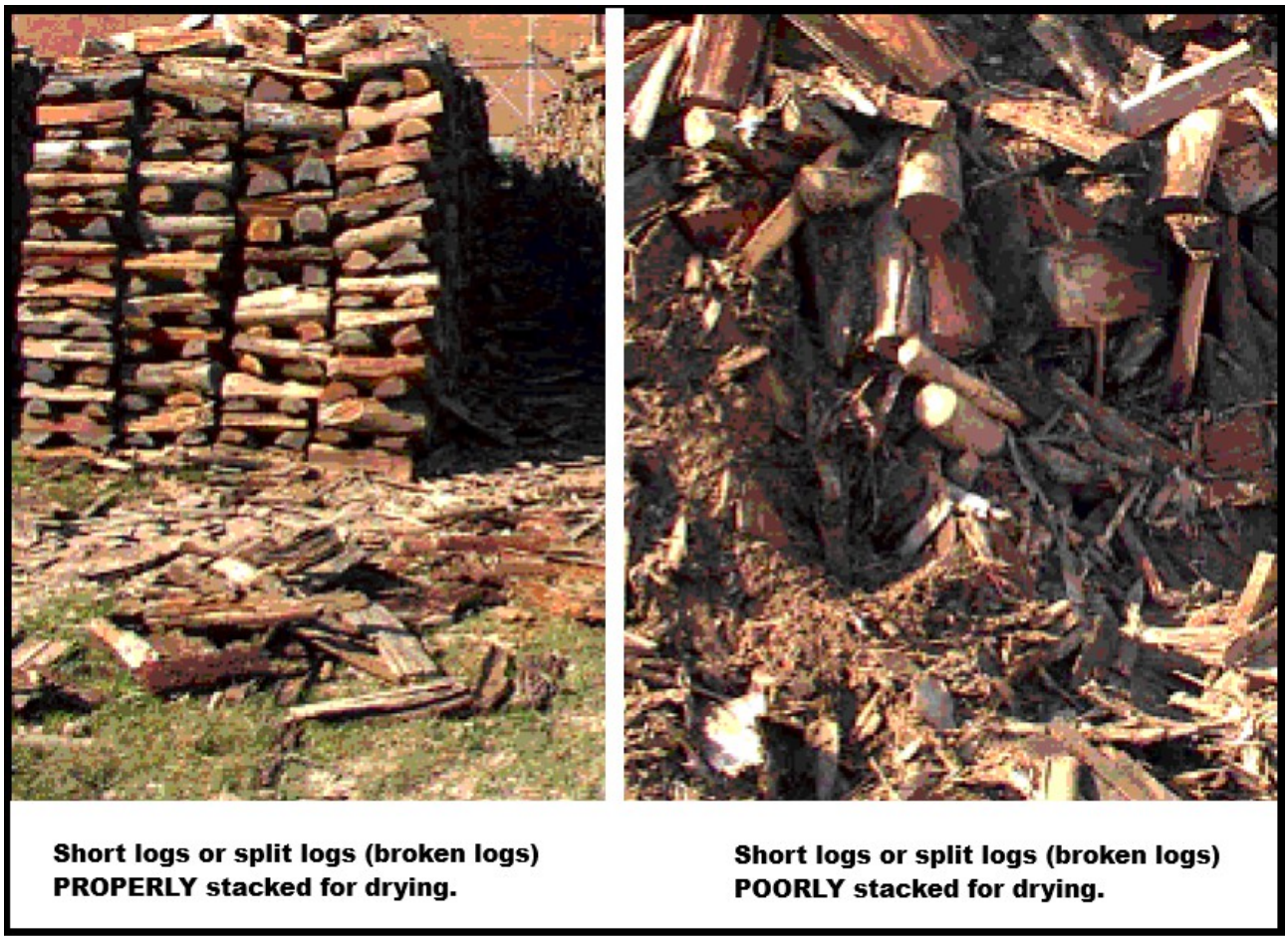
Due to all these factors, firewood should be dried as quickly and under optimal conditions as possible to minimize losses. To achieve this, it is advisable to follow the guidelines outlined above and below.

Winds are essential for drying firewood, as an air current dries it more effectively than direct sunlight (only the wood at the top receives direct sunlight).

Therefore, we must arrange the stacks in an orientation that allows the prevailing winds to pass through the interior of the logs and stacks.

Similarly, we must drain the entire storage area to prevent rainwater from accumulating. Weeds should be kept out of the stacks by using a weed killer or by cleaning them regularly. It's also advisable to use an effective insecticide to eliminate wood-boring insects (the use of these products should be discussed with an agronomist).

Arrangement of the piles of firewood with respect to the prevailing winds throughout the year and land slide rain water draining.



Short logs or split logs (broken logs) PROPERLY stacked for drying.

Short logs or split logs (broken logs) POORLY stacked for drying.

Firewood should not be piled up in a way that prevents air circulation (such as when it is dumped from trucks, either manually or using the truck's tipper). Keep the drying area clear of trees both around its perimeter and within its boundaries. Losses can be as high as 30% or more of the calorific value of firewood dried under good conditions.

See CHAPTER 5: Operation Part 6 for more detail on safe an unsafe woodfire loaders.